Building “Geographic Data Science…”

Dani Arribas-Bel [@darribas]

UNIVERSITY OF LIVERPOOL

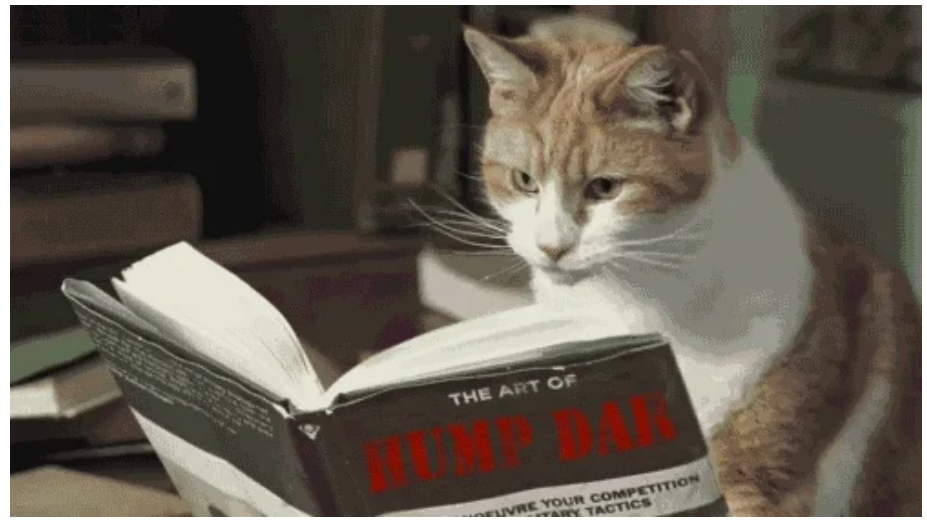
The Alan Turing Institute

Geographic Data Science Lab

This talk

darribas.org/gdsbook_overview/202109

We have a book!



via GIPHY

Almost…

via GIPHY

Coming “soon” but…

Coming “soon” but…

… you can already:

- `https://geographicdata.science`
- launch binder
- `https://github.com/gdsbook/book`

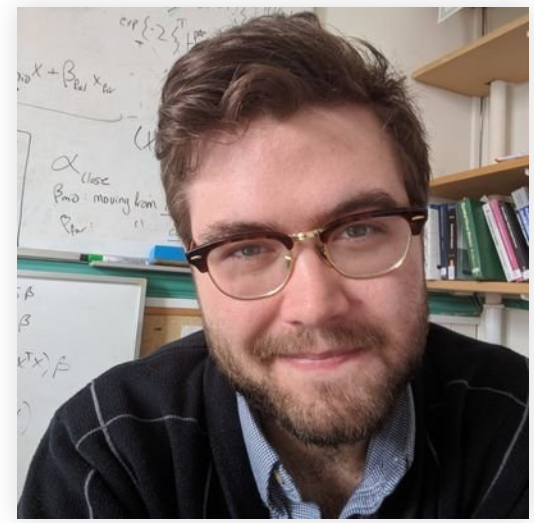
The Authors

@sreyog

Serge Rey

@darribas

Dani Arribas-Bel



@levijohnwolf

Levi Wolf

Today

- *Why?* – Principles
- *What?* – Book
- *How?* – Infrastructure & community

Why?

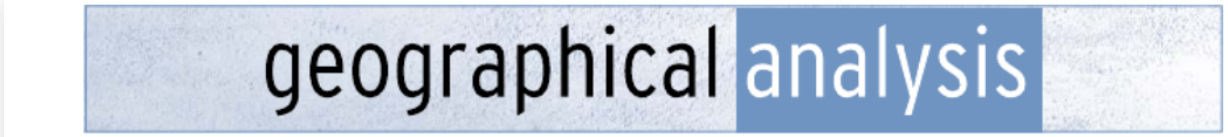
Data, data, data

Data Science

. . .


It’s called GEOGRAPHIC Data Science!!!

Geographic Data Science



Geographical Analysis (2021) **53**, 61–75

Special Issue

Geographic Data Science

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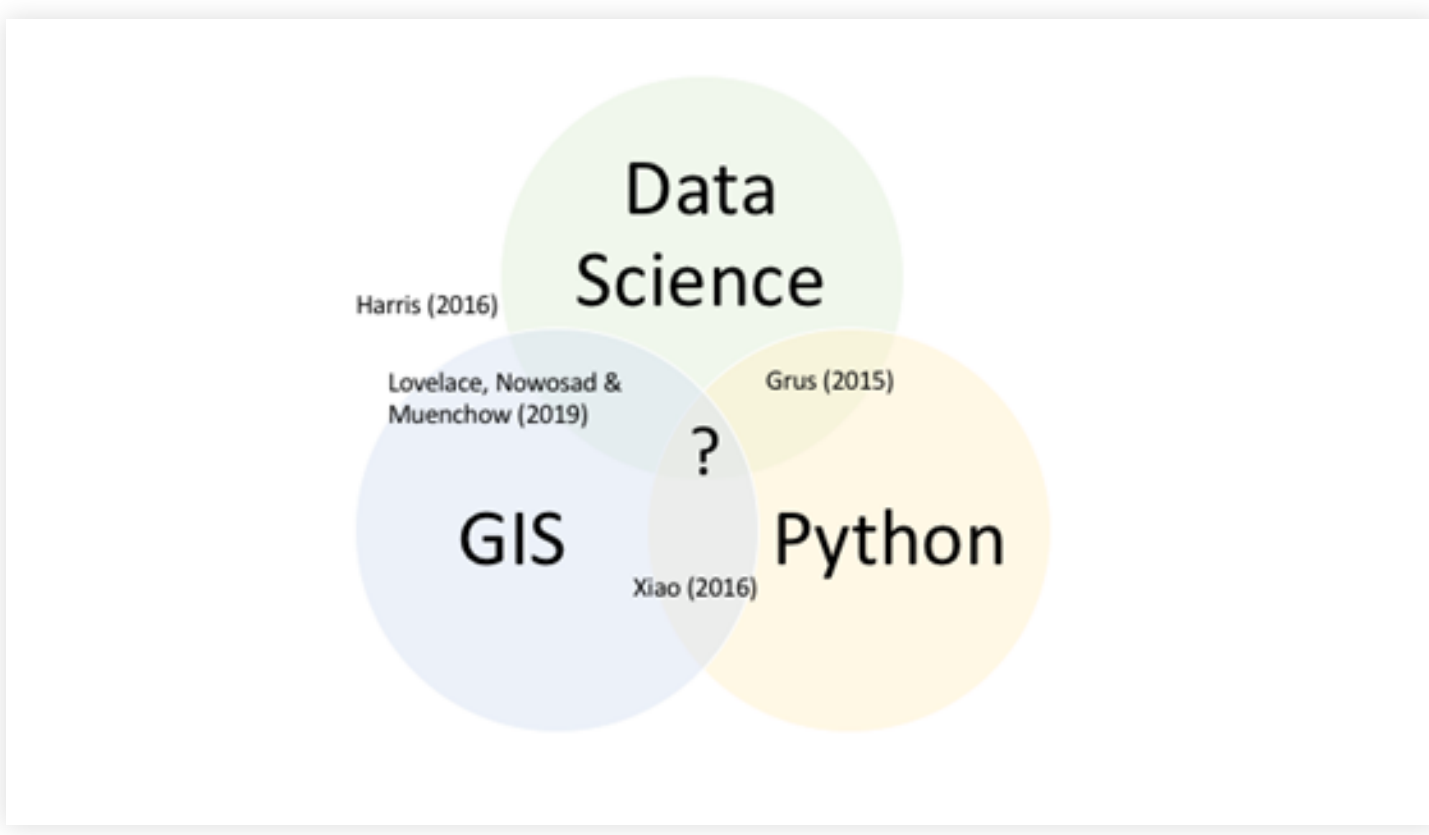
It is widely acknowledged that the emergence of "Big Data" is having a profound and often controversial impact on the production of knowledge. In this context, Data Science has developed as an interdisciplinary approach that turns such "Big Data" into information. This article argues for the positive role that Geography can have on Data Science when being applied to spatially explicit problems; and inversely, makes the case that there is much that Geography and Geographical Analysis could learn from Data Science. We propose a deeper integration through an ambitious research agenda, including systems engineering, new methodological development, and work toward addressing some acute challenges around epistemology. We argue that such issues must be resolved in order to realize a Geographic Data Science, and that such goal would be a desirable one.

Geographic Data Science

- GIScience ↔ Data Science
- Foster innovation (avoid reinventing the wheel)
- Grow a community around collaboration (1+1>2)

What?

The Book is…


Harris (2016)
Data Science
Lovelace, Nowosad & Muenchow (2019)
Grus (2015)
?
GIS
Python
Xiao (2016)

The Book is *not*…

- A GIS starter
- An introduction to programming
- An in-depth volume (rather *in-breath*)

The Book is for…

- Data Scientists who work on spatial problems
- GIScientists who want to "update"
- (Social) Scientists getting started in geospatial

Table of Contents

Part I: Building Blocks

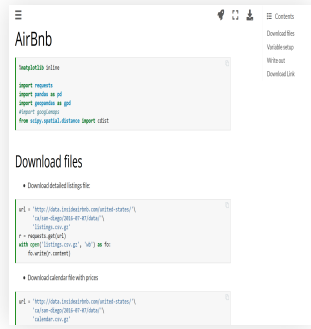
Part II: Spatial Data Analysis

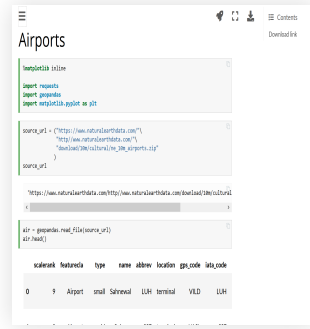
Part III: Advanced Topics

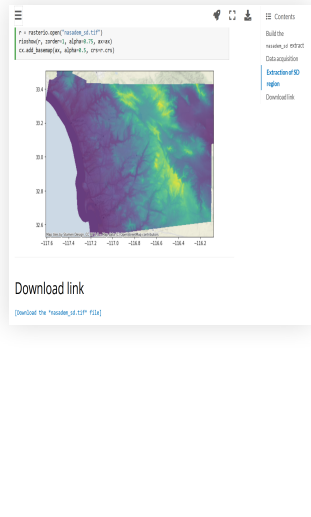
GIScience + Data Science

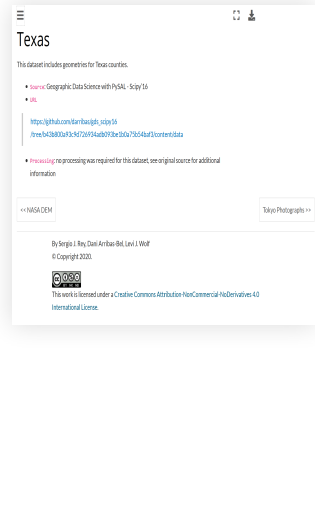
- `geopandas`
- `rasterio`
- `pysal`
- `osmnx`
- `contextily`
- `pandas`
- `xarray`
- `scikit-learn`
- `matplotlib`
- `seaborn`

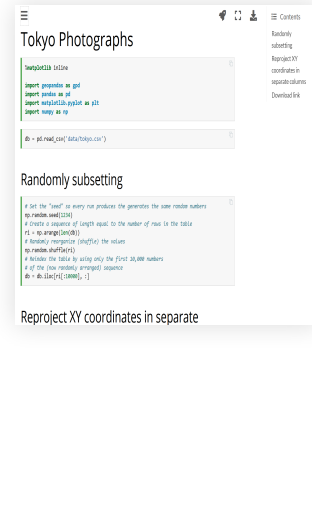
Bonus: Datasets





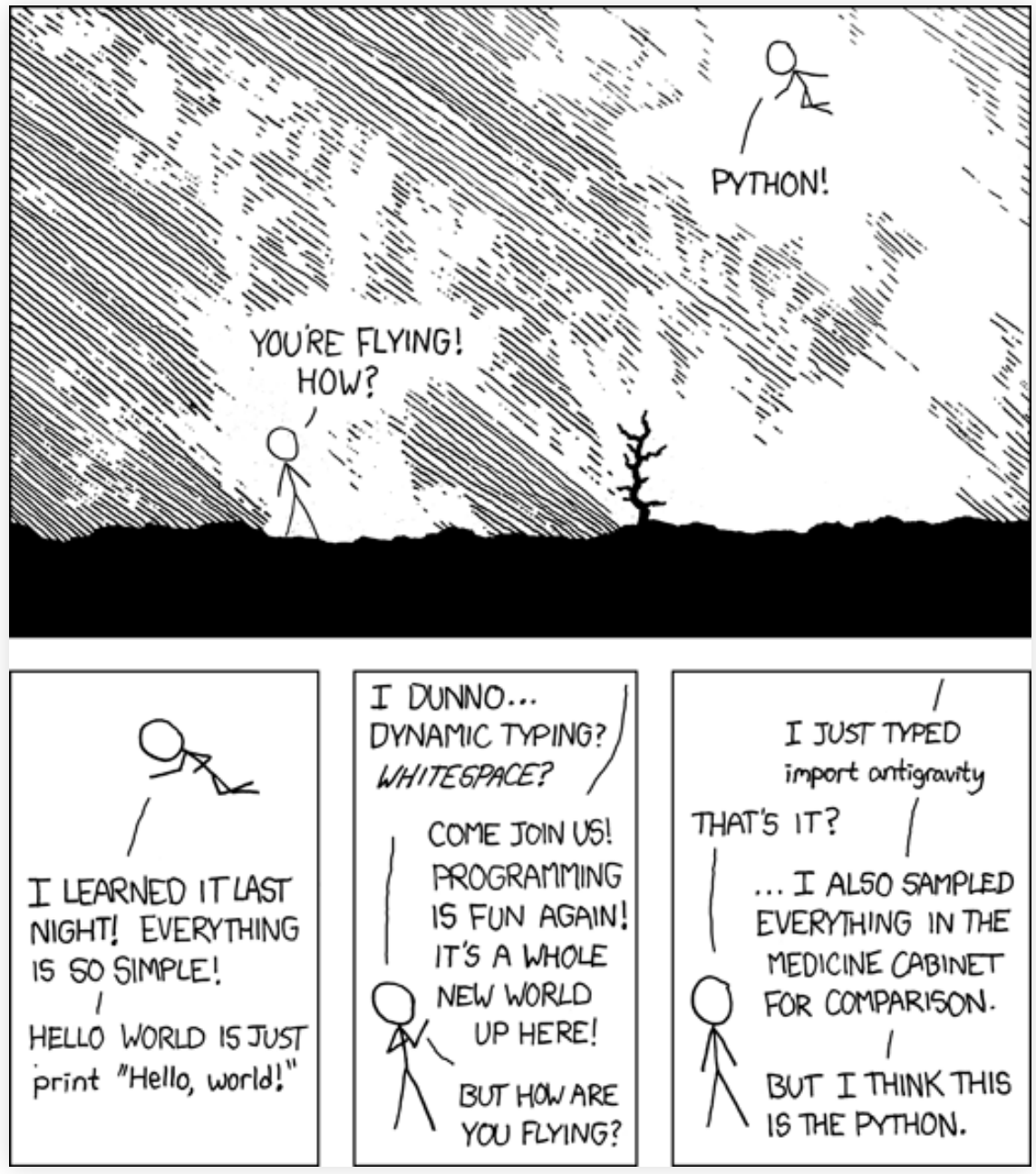






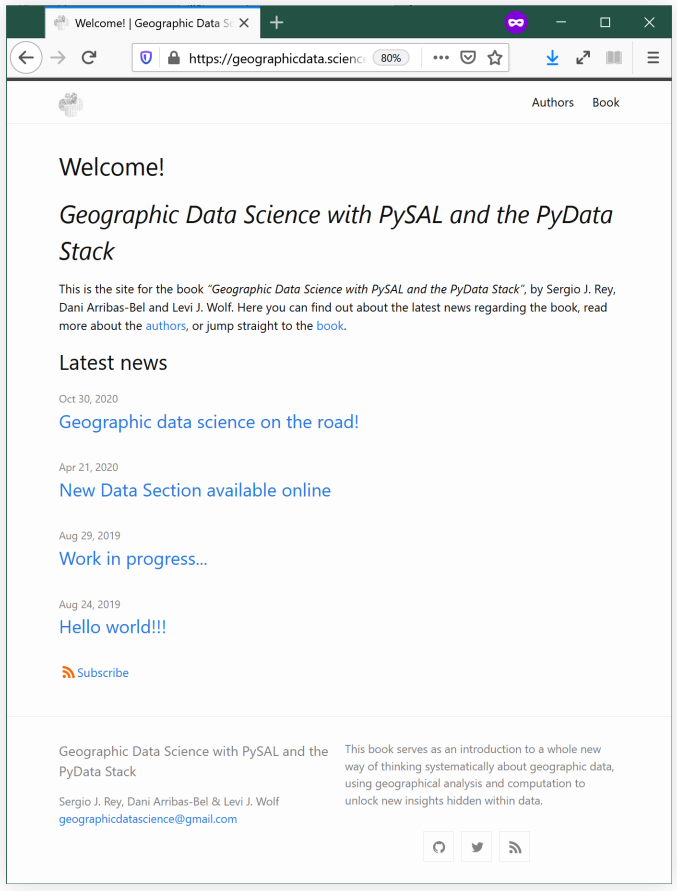
How?

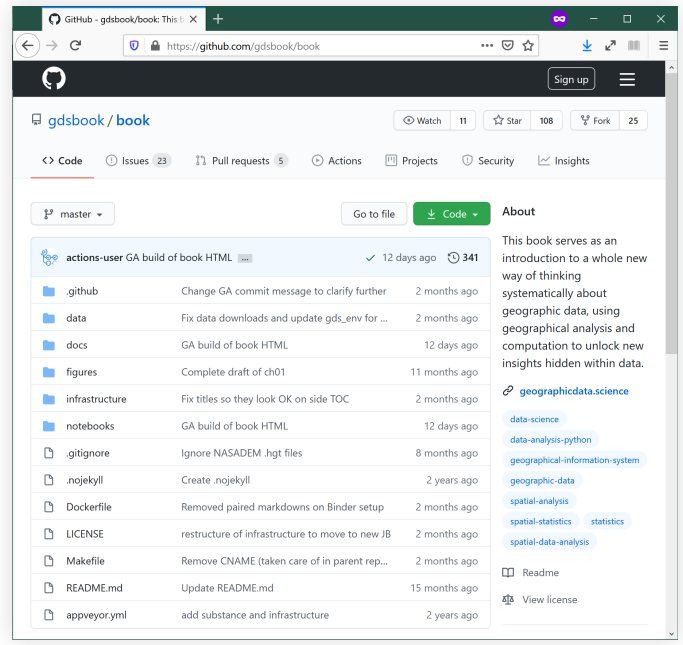
Python

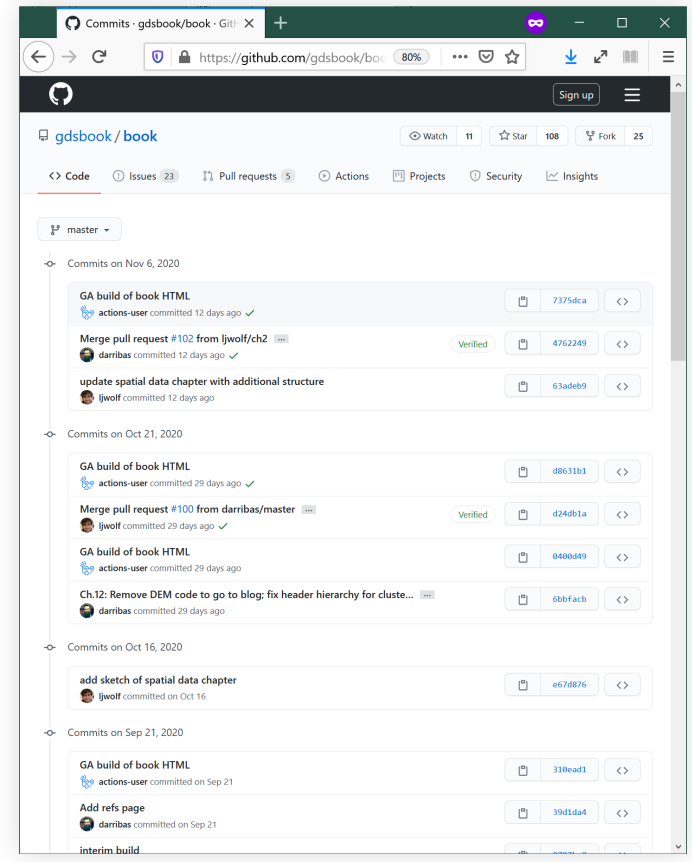


Source

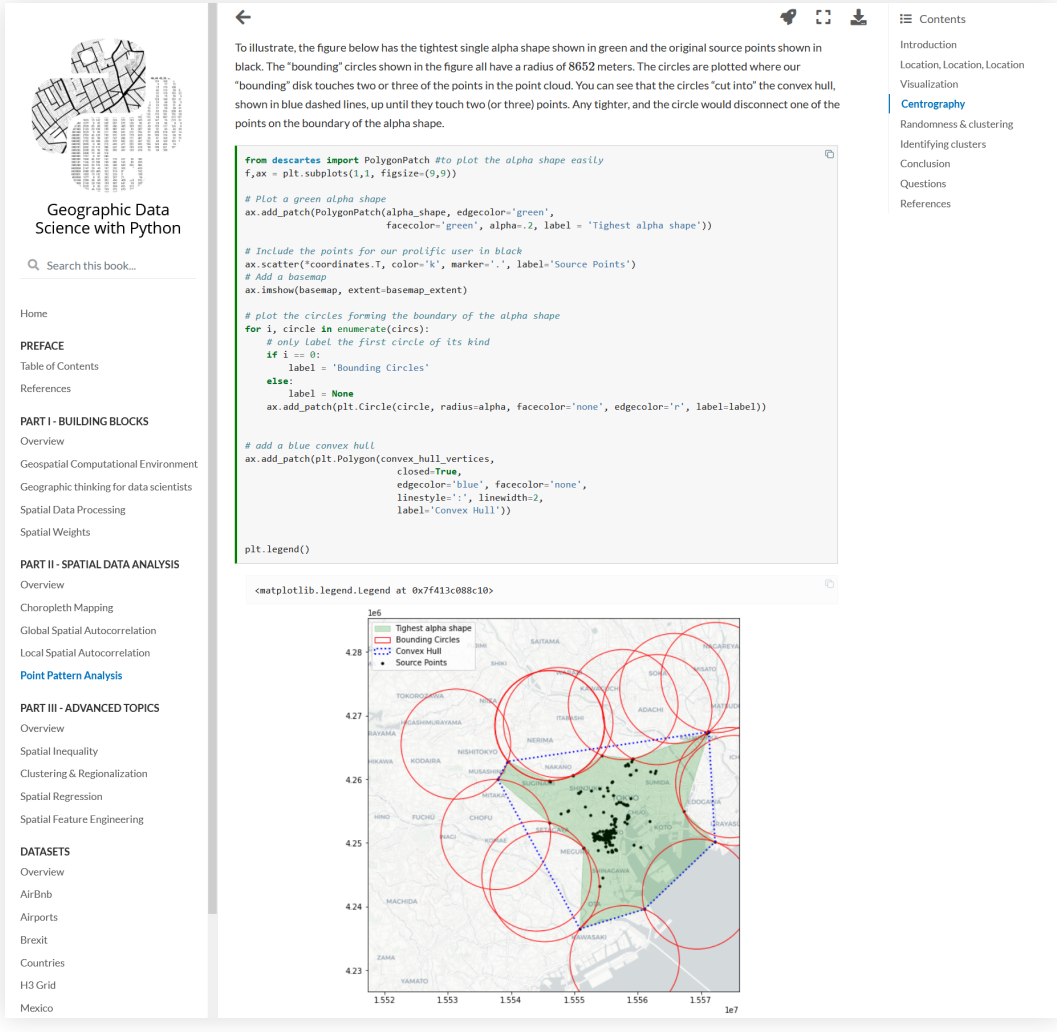
Radically Open

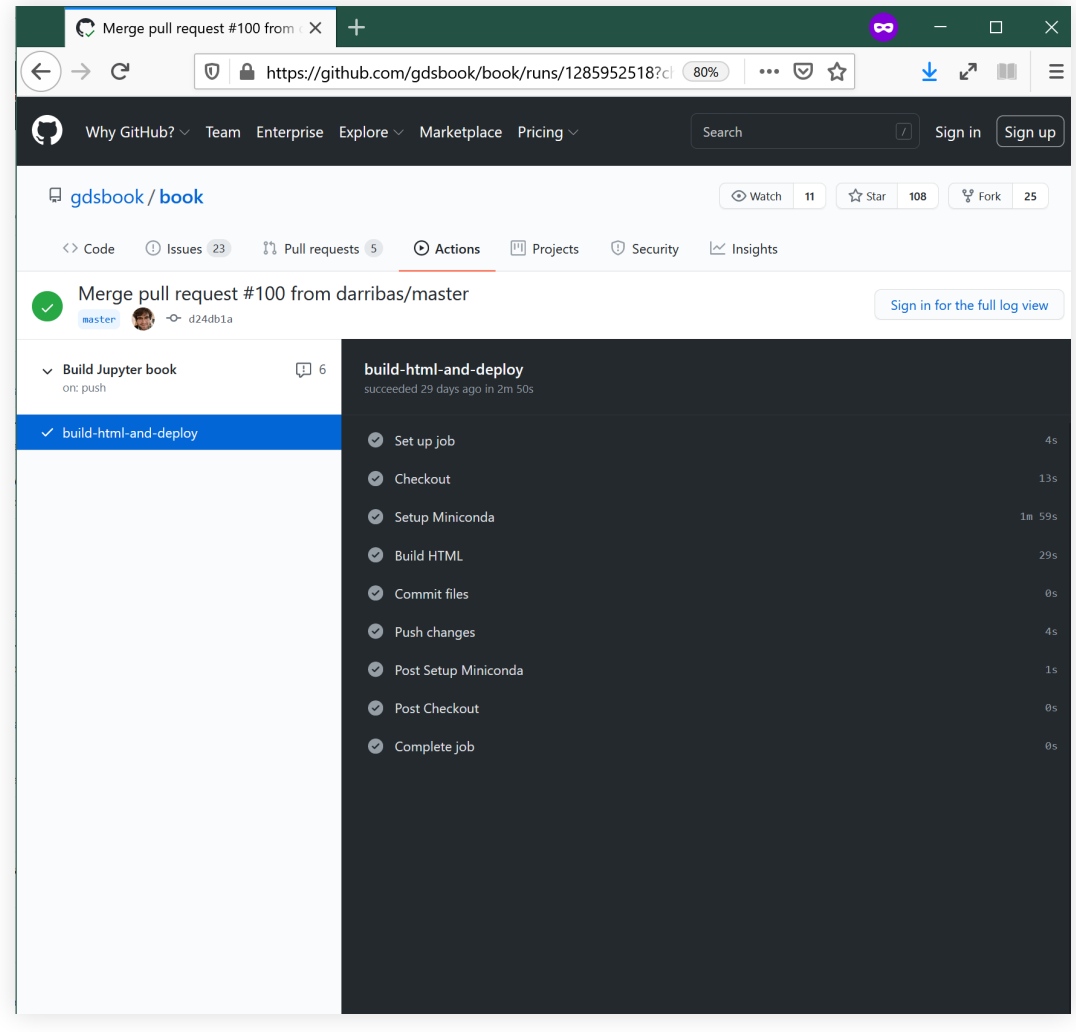




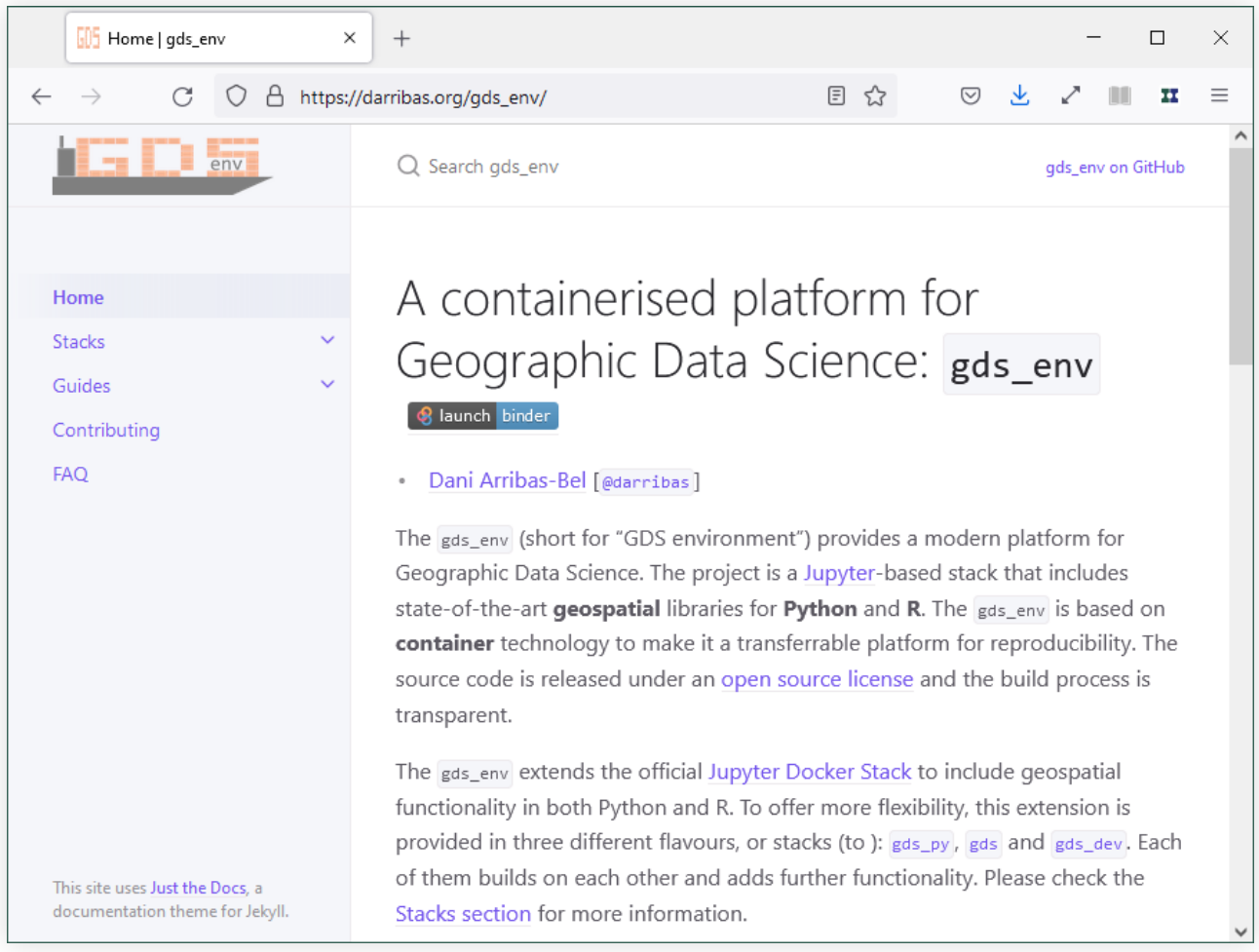


Code as text; text as codE



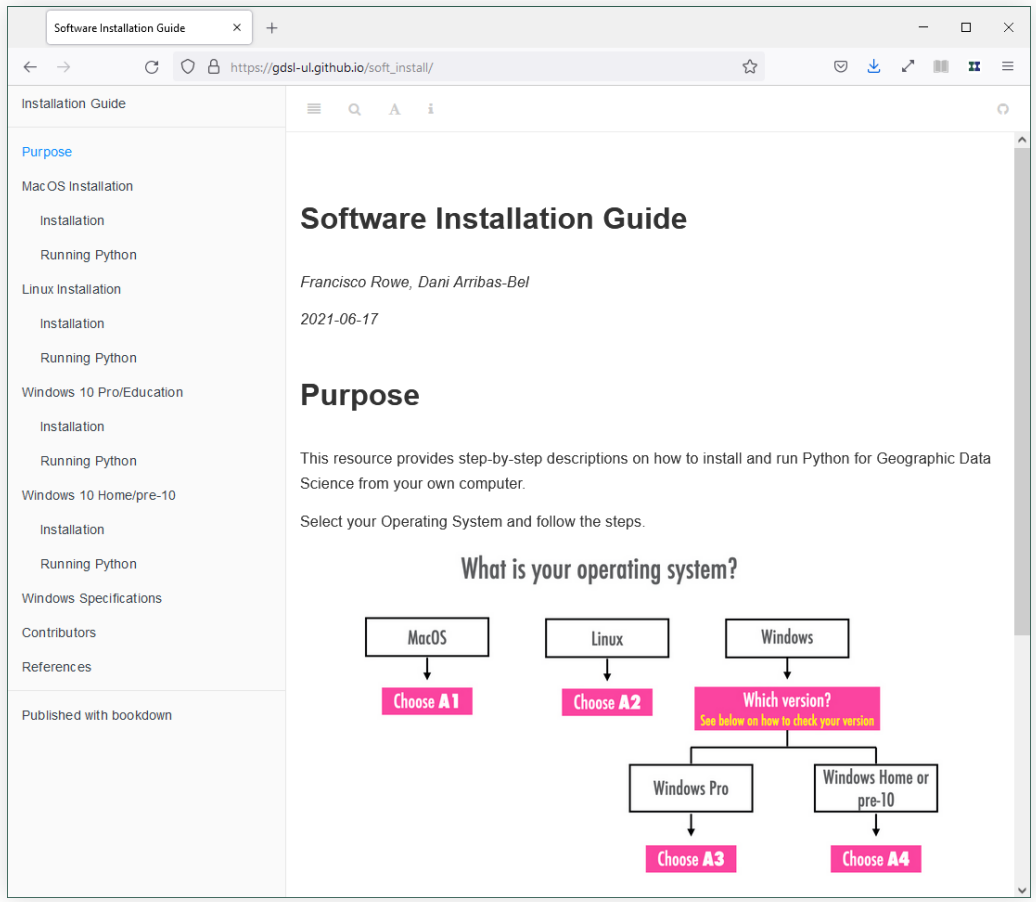


Runs *anywhere*...



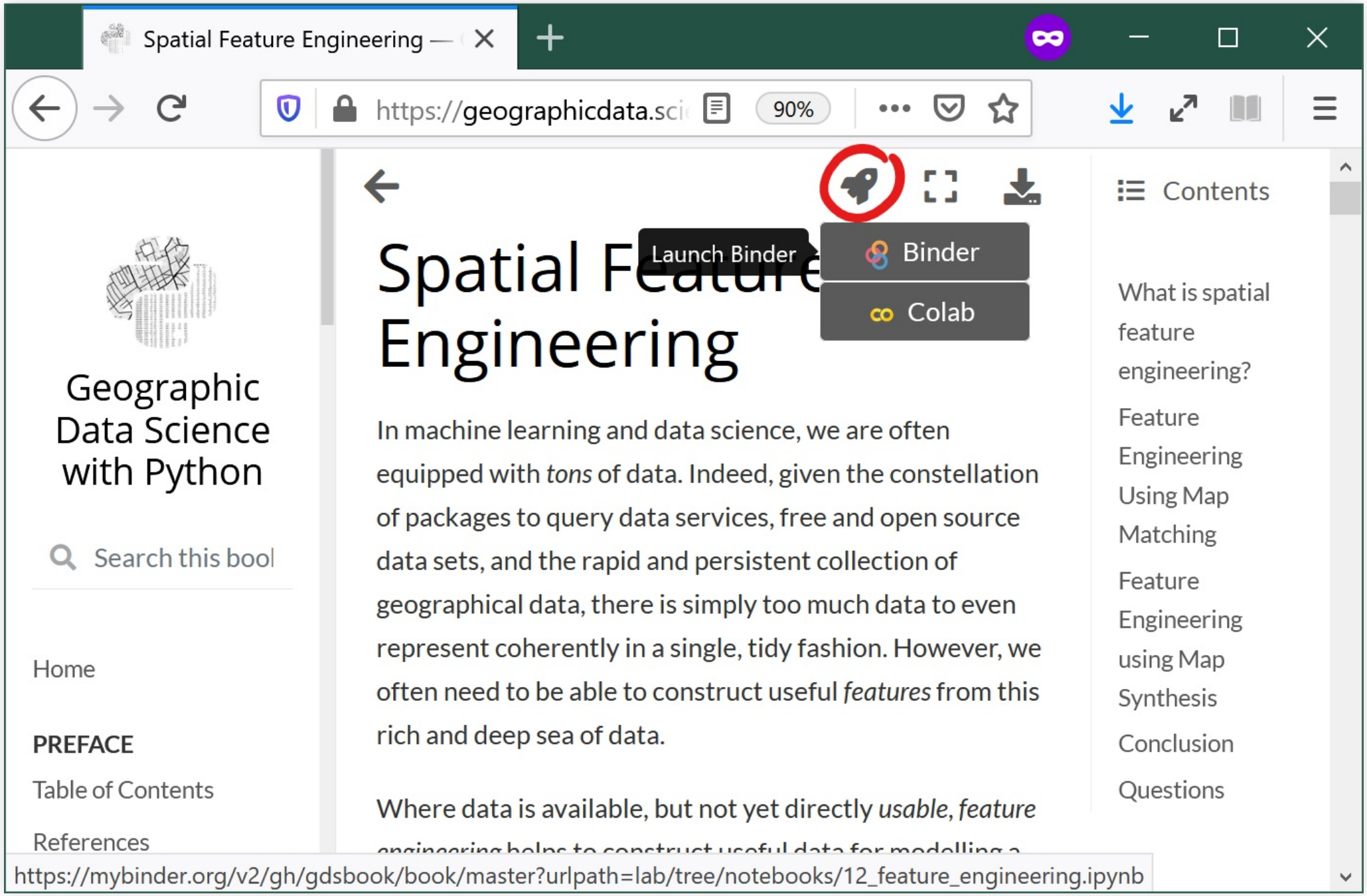
darribas.org/gds_env

… by *anyone*



gdsl-ul.github.io/soft_install

Try it out…


Spatial Feature Engineering —
https://geographicdata.sci
90%
Launch Binder
Binder
Colab
Spatial Feature Engineering
Contents
What is spatial feature engineering?
Feature Engineering Using Map Matching
Feature Engineering using Map Synthesis
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PREFACE
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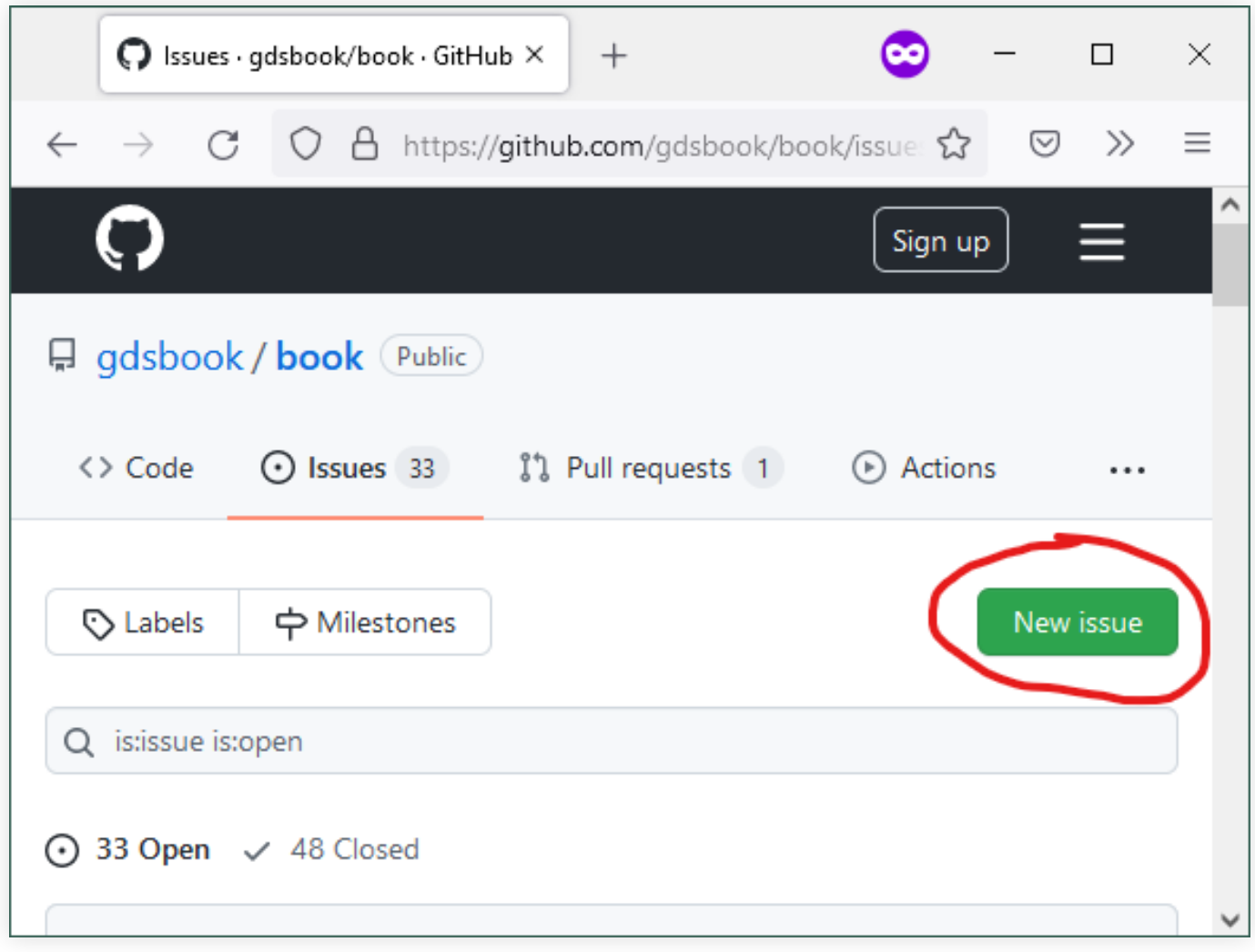
References
In machine learning and data science, we are often equipped with *tons* of data. Indeed, given the constellation of packages to query data services, free and open source data sets, and the rapid and persistent collection of geographical data, there is simply too much data to even represent coherently in a single, tidy fashion. However, we often need to be able to construct useful *features* from this rich and deep sea of data.
Where data is available, but not yet directly *usable*, *feature*
https://mybinder.org/v2/gh/gdsbook/book/master?urlpath=lab/tree/notebooks/12_feature_engineering.ipynb

. . .and make it better!!!



`github.com/gdsbook/book/issues/new`

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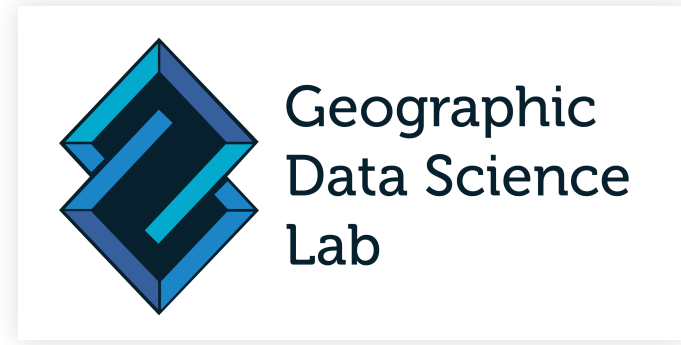

[PDF version of these slides]